

Unofficial Comment Form

Project 2019-04 Modifications to PRC-005-6

Do not use this form for submitting comments. Use the [Standards Balloting and Commenting System \(SBS\)](#) to submit comments on the **Project 2019-04 Modifications to PRC-005-6 Standard Authorization Request (SAR) by 8 p.m. Eastern, Wednesday, July 8, 2020.**

Additional information is available on the [project page](#). If you have questions, contact Laura Anderson, NERC standards developer, [Laura Anderson](#) (via email), or at (404) 446-9671.

Background Information

The North American Generator Forum (NAGF) received feedback from members indicating that there was confusion regarding the applicability of protective functions inside synchronous generator excitation systems to PRC-005. The primary cause of confusion is the use of the NERC term “Protection System”, which specifies "relays" but not the protective functions that are typically (but not always) associated with relays. Excitation systems may measure and utilize similar quantities as protective relays and often may perform similar functions as protective relays applicable to PRC-005. For this reason, the SAR drafting team agrees that the aforementioned protective functions within excitation systems and other control systems need to be clearly and explicitly applicable to PRC-005.

PRC-005 will be modified to provide clarity on the inclusion of protective functions enabled within excitation systems (analog/digital Automatic Voltage Regulators (AVRs)), and other control systems that respond to electrical quantities and act to cease injecting current, or trip Bulk Electric System (BES) elements either directly or via lockout or auxiliary tripping relays. The clarifying changes would apply to BES Protection Systems and protective functions applied on generators, dispersed power-producing resources from the point of aggregation (greater than 75 MVA) to the point of Interconnection, static and synchronous condensers, and other BES elements as defined.

The SAR drafting team recommends considering the specification of ANSI Standard Device Numbers for the applicability to PRC-005 as outlined in the Applicability Section 4.2. Other options to provide clarity include: developing standard-specific definitions, developing or revising existing terms in the NERC Glossary of Terms, or making other modifications to the Applicability section.

The maintenance tables should be updated to include the aforementioned protective functions within control systems, and the associated maintenance activities and intervals.

Additionally, the maintenance tables should be updated to include new Direct Current (DC) supply technologies for Protection System(s) not currently captured.

This project would modify Reliability Standard PRC-005 to be consistent with the Federal Energy Regulatory Commission (FERC)-approved changes to registration as part of the Risk Based Registration

(RBR) initiative and to add Underfrequency Load Shedding (UFLS)-only Distribution Providers (DPs) in the Applicability Section.

Questions

1. The SAR drafting team determined that BES protective functions that respond to electrical quantities inside excitation systems (including analog/digital AVRs) should be included in PRC-005, in addition to protective functions inside other control systems for BES elements. Do you agree that BES protective functions that respond to electrical quantities inside excitation systems and other BES element control systems should be included in PRC-005? If you do not agree, or if you agree but have comments or suggestions, provide your recommendation or proposed modification in the comments section.

Yes

No

Comments:

Specifically, the scope is now expanded as written to "other control systems" that respond to electrical quantities and act to cease injecting current (75 MVA or greater) or trip BES elements either directly or via lockout or auxiliary tripping relays" and was not the intent of the original request. Such an expansion of scope will have significant impacts on entity maintenance programs without justified reliability benefits.

Due to the lack of clear guidance on the scope and applicability of the Excitation systems /Automatic Voltage Regulator (AVR) on PRC-005. Excitation system includes several controls, limiting and protective functions – control functions regulate specific quantities at the desired level, and the limiting functions prevent certain quantities from exceeding set limits and these are examined closely and reported as part of PRC-019.

We agree fundamentally that any BES protective function that responds to electrical quantities inside excitation systems and other BES Element's control systems that would operate in the same manner as a protective relay should be included in PRC-005. It is important to note that a protective relay is a device designed to trip a circuit breaker when a fault is detected. Therefore it is imperative that the SDT makes a clear differentiation between a control system that is responding to electrical quantities by adjusting generator output in response to a variation in system conditions as these types of control systems do not actually trip the generation offline, are not associated with a protective relay and therefore are entirely independent of a Protection System.

The revised standard should remain "technology neutral". While an AVR does respond to electrical quantities, not all AVR's contain protective functions that would trip the generation offline.

Clarification that the control system protective function must meet the functionality of a protective relay with the ability to trip a circuit breaker when certain conditions are met is required. Control system is a broad term and there are many variations of "control system" that

respond to electrical quantities that affect the output of generation but do not trip the generation offline. For example, because a wind farm generation site's typical voltage control is through a proprietary digital control system, and not an automatic voltage regulator (AVR) as typically seen on conventional generation, the SAR should clarify that this type of digital technology will not require maintenance and testing activities per PRC-005-6. Typically, these proprietary digital control devices will switch to power factor mode if automatic voltage regulation fails, and will not cause a trip of generation either directly or via lockout or auxiliary relays.

2. The NERC Glossary of Terms defines Protection System as: "*Protection System –*

- *Protective relays which respond to electrical quantities,*
- *Communications systems necessary for correct operation of protective functions,*
- *Voltage and current sensing devices providing inputs to protective relays,*
- *Station dc supply associated with protective functions (including station batteries, battery chargers, and non-battery-based dc supply), and*
- *Control circuitry associated with protective functions through the trip coil(s) of the circuit breakers or other interrupting devices."*

This definition omits protective functions in the excitation and other control systems that respond to electrical quantities and voltage/current sensing devices providing inputs to protective functions. In addition, the SAR drafting team found that the lack of a definition for protective function creates confusion and potential reliability gaps. These protective functions may measure similar quantities and may yield similar outcome as protective relays. Do you agree that this definition creates confusion with regards to protective functions embedded in control systems? If you do not agree, or if you agree but have comments or suggestions, provide your recommendation or proposed modification in the comments section.

- Yes
 No

Comments:

Yes, we agree that the definition creates confusion because the current definition of the protection system is protective relay centric. It should be technology or equipment neutral and focuses on protective functions.

3. The SAR drafting team determined that there are Protection System Station DC supply technologies that do not currently have maintenance activities in Reliability Standard PRC-005. Do you agree the standard should provide for the use of emerging Protection System Station DC supply technologies (battery-based and non-battery-based), and ensure that they are subject to

maintenance requirements? If you do not agree, or if you agree but have comments or suggestions, provide your recommendation or proposed modification in the comments section.

- Yes
 No

Comments:

It must be clear that this is only pertaining to the DC supply for the Protection System. Maintenance items for Protection System DC supply should not be confused with maintenance activities for DC technologies which are installed for any other purpose (i.e. supplying services to the BES).

Another consideration is as technology evolves the standard should not limit the use of new technologies that are not contemplated by the standard. It will be important to avoid specifically defining what these technologies are in order to allow entities to use the new technologies.

It is proposed that the SAR drafting team modify the SAR to more clearly describe the technology it believes PRC-005 presently applies and excludes, and to more directly state the reliability gap that is being addressed. It is also unclear how the current standard does not already adequately address this technology. Proposed changes to a Reliability Standard should clearly address any reliability gaps and other industry needs within the Industry Needs section of the SAR. At this time, no justification has been provided.

4. Entities registered as ULFS-only DPs have PRC-005-applicable Protection Systems, but are not expressly listed as Applicable Entities in Section 4.1. ULFS-only DPs should be added to the Applicability Section to avoid any confusion and to be consistent with the FERC-approved RBR registration changes. [Project 2017-07 Standards Alignment with Registration](#) Do you agree with adding ULFS-only DPs as a Functional Entity applicable to PRC-005 to align with registration? If you do not agree, or if you agree but have comments or suggestions, provide your recommendation or proposed modification below.

- Yes
 No

Comments:

Yes, this change should be made to correspond with the NERC's Rules of Procedure Appendix 5B: Statement of Compliance Registry Criteria.

5. Are there any logistical or cost considerations that would add significant burden to equipment owners trying to confirm protective functions in an exciter, inverter, or other control system? If so,

do you have a more cost effective suggestion to accomplish the objective of the SAR that the drafting team should consider?

Yes

No

Comments:

The drafting team should avoid treating these control systems as relays since they do not function in the same way as a protective relay. Therefore the methods of testing and maintaining this equipment will require careful consideration and may not align with the current requirements of relay maintenance. Considerations should be made to ensure that it is not cost-prohibitive or introduce the risk of damage to test and maintain this equipment.

6. Provide any additional comments for the drafting team to consider, if desired.

Comments:

Please consider changing the "SAR Type" to read as "Revision to Existing Standard" instead of "New Standard."

1. In the "Industry Need" section, the SAR states: "... and other control systems, that respond to electrical quantities and act to cease injecting current (75 MVA or greater)..." Does this include BES Definition Inclusion 2 generation? If so, this would already be addressed in the applicability statements in PRC-005-6.
2. In the "Industry Need" section, the SAR states: "Without clear applicability...". This needs to be re-stated. Applicability refers to entities. The purpose of the SAR is to define what components are considered "Relays" within the definition of Protection System, or redefining what a Protection System is and is in section 4.2 "Facilities".
3. The project scope states the following: "Modify PRC-005 to provide clarity that the protective functions enabled within analog/digital AVRs, excitation systems, and other control systems that respond to electrical quantities and act to cease injecting current or trip BES elements either directly or via lockout or auxiliary tripping relays are within the scope of the standard. Modifications to PRC-005-6 could also include defining terms, revising applicability, modifying maintenance activities and intervals, or other appropriate modifications needed to provide clarity. In addition, modify the PRC-005-6 Supplementary Reference and FAQ to align with revisions to PRC-005-6. The clarifying changes would apply to BES Protection Systems and protective functions applied on generators, dispersed power-producing resources from the point of aggregation (greater than 75 MVA) to the Point of Interconnection, static and synchronous condensers and other BES elements as defined."

It will be extremely difficult to appropriately capture "control systems that respond to electrical quantities and act to cease injecting current..." Momentary cessation occurs at individual inverters. The standard is limited to only controls that impact 75MVA or greater as it is understood that individual dispersed resources do not have a significant impact on BES reliability. Due to the sheer

- number of these devices that may be embedded in dispersed generation resources, Maintenance and testing activities for these entities could potentially be cost-prohibitive.
4. The above statement also mentions "... also include defining terms, revising applicability, modifying maintenance activities and intervals, or other appropriate modifications needed to provide clarity." If this is the case, then the appropriate boxes will need to be checked in the "SAR Type".
 5. The statement to modify the PRC-005-6 Supplementary Reference and FAQ should not be included in the SAR. This activity would be done outside the SAR.
 6. It is important for the SAR language to allow flexibility for the SDT. Currently, the SAR uses language such as "...provide clarity that the protective functions..." which leads to a presupposed position. The SDT should conduct the technical analysis to make the determinations of applicability to the standard. The SAR should be modified in recognition of the SDT purpose.